

Appia No. 09/575,119
Amdt. Dated August 10, 2004
Response to Office action of June 16, 2004

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of controlling a printer module to print an image, said printer module comprising a first authentication means, an ink cartridge incorporating a second authentication means, a printhead that prints an image on printable media with ink from the ink cartridge, image storage memory ~~that stores the image, and an image access unit and a print generator unit that accesses the image in the image storage memory,~~ said method including the steps of:
 - authenticating the ink cartridge by comparing said first authentication means and said second authentication means;
 - said image access unit storing an image in the image storage memory;
 - sensing the presence of printable media in the printer module;
 - activating a motor to advance said printable media past said printhead in said printer module;
 - said print head interface retrieving said image from said image storage memory₁;
 - transforming said image to a form suitable for said printhead₂; and
 - transferring said transformed image to said printhead in a synchronous manner for printing by said printhead on said printable media.
2. (Previously Presented) The method of claim 1 wherein said step of storing an image in image storage memory includes transferring an image from an image capture means to said image storage memory via said image access unit.
3. (Original) The method of claim 1 wherein the step of transforming said image includes transforming said image to a dithered CMY image for printing by said printhead.
4. (Original) The method of claim 3 wherein said CMY image has a resolution of 1600dpi.
5. (Original) The method of claim 1 wherein said image is stored in image storage memory in L*a*b* format and said step of transforming said image further includes the step of converting said image from L*a*b* format to CMY format.

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6. (Original) The method of claim 5 wherein said step of converting said image from L*a*b* format to CMY format is a tri-linear interpolation process.

7. (Original) The method of claim 1 wherein the step of transforming said image further includes the steps of:

up-interpolating said image to a suitable resolution for printing;

dithering pixels in said image; and

formatting said image so that said image is represented by a dot function, each dot corresponding to an ink nozzle of said printhead.

8. (Original) The method of claim 1 wherein the step of dithering the image converts contone CMY to dithered bi-level CMY.

9. (Original) The method of claim 1 wherein said step of printing includes a further step of preheating and/or cleaning nozzles in said printhead.

10. (Currently Amended) A method of printing an image from image storage memory in a printer module including the steps of:

a print generator unit of a printhead interface retrieving said image from said image storage memory; and

transforming said image to a form suitable for a printhead;

generating a first synchronization signal to advance a paper drive stepper motor;

generating a second related synchronization signal to synchronize transfer of said image to said printhead; and

transferring said transformed image to said printhead in a synchronous manner for printing by said printhead on a printable media advanced by said paper drive stepper motor in a synchronous manner.

11. (Original) The method of claim 10 wherein the step of transforming said image further includes the steps of:

up-interpolating said image to a suitable resolution for printing;

dithering pixels in said image; and

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formatting said image so that said image is represented by a dot function, each dot corresponding to an ink nozzle of said printhead.

12. (Currently Amended) A controller for a printer module having a printhead that prints an image on printable media, said controller comprising:

a central processing unit;

program memory associated with said central processing unit, said program memory storing program steps for execution by said central processing unit to operate said printer module to print said image;

one or more interface units communicating with components of said printer module;

image storage memory storing said image;

a printhead interface including a print generator unit and an interface unit; and

an image access unit in communication with said image storage memory, said central processing unit and ~~the print generator unit of the~~ printhead interface, said image access unit accessing said image in said image storage memory and transferring said image to said printhead interface on command from said central processing unit;

wherein said ~~printhead interface~~print generator unit transforms said image for printing ~~by transfer to the printhead by said interface unit.~~

13. (Original) The controller of claim 12 further comprising scratch memory associated with said central processing unit for variable storage.

14. (Original) The controller of claim 12 further comprising a serial bus interface communicating with a Serial Bus of a compact printer system including one or more further modules, said Serial Bus communicating power and data between said printer module and said one or more further modules.

15. (Original) The controller of claim 14 wherein said data includes image data stored in said image storage memory.

16. (Original) The controller of claim 12 wherein said central processing unit is a micro-controller running at about 1 Mhz.

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17. (Original) The controller of claim 12 wherein at least one of said one or more interface units is a parallel interface unit communicating with at least a motor, said motor activating under control of said central processing unit to advance said printable media past said printhead.

18. (Original) The controller of claim 12 wherein said image storage memory is greater than 1 Mbytes.

19. (Original) The controller of claim 12 wherein said image storage memory is approximately 1.3 Mbytes.

20. (Original) The controller of claim 12 wherein said program memory is no greater than 8 Kbytes.

21. (Original) The controller of claim 13 wherein said scratch memory is no greater than 2 Kbytes.

22. (Original) The controller of claim 12 wherein said printhead interface includes a print generator unit that transforms said image stored in said image storage memory to a dithered CMY image for printing by said printhead.

23. (Original) The controller of claim 22 wherein said dithered CMY image has a resolution of 1600dpi.

24. (Currently Amended) The controller of claim 12 wherein said printhead interface includes a synchronization generator unit that generates synchronization signals for transferring said image from said printhead interface to said printhead.

25. (Original) The controller of claim 24 wherein said synchronization generator unit generates signals for synchronization of a motor of said printer module.

26. (Original) The controller of claim 12 wherein at least one of said one or more interface units communicates with a QA chip of an ink cartridge.

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27. (Original) The controller of claim 26 wherein two of said one or more interface units communicate with a pair of QA chips, one said QA chip being said QA chip of said ink cartridge and the other said QA chip being an associated QA chip, said QA chips cooperating to authenticate said ink cartridge for said printer module.

28. (Original) The controller of claim 12 wherein said controller is an application specific integrated circuit.

29. (Currently Amended) A controller for a printer module having an ink cartridge and a printhead that prints an image on printable media with ink from the ink cartridge, said controller comprising:

a central processing unit;

program memory associated with said central processing unit, said program memory storing program steps for execution by said central processing unit to operate said printer module to print said image;

two or more interface units communicating with components of said printer module, at least a first said interface unit connecting to an authentication means in the ink cartridge and at least a second interface unit connecting to an authentication means in the printer module;

image storage memory storing said image;

a printhead interface including a print generator unit and an interface unit; and

an image access unit in communication with said image storage memory, said central processing unit and ~~a~~ the print generator unit of the printhead interface, said image access unit accessing said image in said image storage memory and transferring said image to said printhead interface on command from said central processing unit;

wherein said ~~printhead interface~~ print generator unit transforms said image for ~~printing by~~ transfer to the printhead by said interface unit.

30. (Previously Presented) The controller of claim 29 wherein said authentication means in the ink cartridge is a first QA chip and said authentication means in the printer module is a second QA chip.

31. (New) A method of controlling a printer module to print an image using an approved ink cartridge incorporating a second authentication means, said printer module comprising a

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first authentication means, a printhead that prints an image on printable media with ink from the approved ink cartridge, image storage memory that stores the image, and an image access unit and a print generator unit that accesses the image in the image storage memory, said method including the steps of:

- authenticating the approved ink cartridge by comparing said first authentication means and said second authentication means and preventing printing if said authentication fails;

- said image access unit storing an image in the image storage memory;

- sensing the presence of printable media in the printer module;

- activating a motor to advance said printable media past said printhead in said printer module;

- said print head interface retrieving said image from said image storage memory, transforming said image to a form suitable for said printhead, and

- transferring said transformed image to said printhead in a synchronous manner for printing by said printhead on said printable media.